The Resolution of the Diamond Problem After 200 Years

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Abstract:

The diamond problem spans more than 200 years. Many technologies from electric arcs, to metal solvents to metal catalysts to electric ovens to electric resistive heating to anvil vices and presses to chemical vapor deposition (CVD) to plasma to microwaves to hot filaments to flames and now to magnets have been discovered, realized and used to resolve the diamond problem. Here the origin, definition and cause of the diamond problem are presented. The resolution of the diamond problem is then discussed. Furthermore, the partial resolutions (of high pressures and high temperatures, catalysts and atomic H vapor) for this problem within the last 50 years are reviewed and the recent complete resolution is demonstrated by use of strong magnetic fields in conjunction with these partial solutions for faster, larger single crystal diamond synthesis.